

Listing of Claims

The following listing of claims will replace all prior versions, and listings, of claims in the subject application:

1. (currently amended) A sheet feeder for separating sheets stacked on a pivotable sheet material stacking member and feeding said sheets, one by one, from the topmost sheet, said sheet feeder comprising:

a sheet feed roller configured to come in pressing contact with the topmost sheet for feeding the sheet to a separator; and

a tilt member configured to come in pressing contact with said sheet feed roller and including a tilt face, said sheet feed roller having a front end running against said tilt face, said tilt member having a contact face in contact with said sheet feed roller,

wherein said contact face ~~being~~ is in the shape of a narrow raised edge extending along an axial direction of said sheet feed roller,

said narrow raised edge forms substantially the entirety of said contact face and is adjacent to an end of said tilt face, and

said substantially the entirety of said contact face is in contact with said sheet feed roller.

2. (original) A sheet feeder according to claim 1, wherein said tilt member is in pressing contact with said sheet feed roller for pivotal movement with respect to said sheet feed roller.

3. (previously presented) A sheet feeder according to claim 1, wherein said tilt member includes translating means for advancing and

retracting said tilt member with said edge remaining parallel to an axis of said sheet feed roller.

4. (original) A sheet feeder according to claim 3, wherein said translating means includes a rib formed on one of said tilt member and a feeder body, and a guide rail formed on the other.

5. (original) A sheet feeder according to claim 1, wherein said tilt members contact face has a length which is less than an axial length of said sheet feed roller.

6. (original) A sheet feeder according to claim 1, wherein said tilt member is formed of a synthetic resin, and includes a metal plate for covering at least the contact face with said sheet feed roller.

7. (original) A sheet feeder according to claim 6, wherein said metal plate is elastic.

8. (previously presented) A sheet feeder according to claim 7, wherein said elastic metal plate is mounted at the tilt face so as to surround said tilt member on both upper and lower sides.

9. (previously presented) A sheet feeder according to claim 1, wherein said sheet feed roller feeds said sheets in a feed convey direction, and the distance in said sheet material convey direction between a location of said sheet feed roller at which said tilt member is in pressing contact with said sheet feed roller and a location of said sheet feed roller at which a sheet stacked on said sheet stacking member comes in contact with said sheet feed roller is in a range of 2

mm to 6 mm, and the angle of the tilt face of said tilt member to the sheet material convey direction is in a range of 50° to 70°.

10. (original) A sheet feeder according to claim 1, further comprising a thin elastic member disposed at a location downstream of a contact area of said sheet feed roller in contact with said tilt member such that said thin elastic member crosses a tangential direction of said contact area.

11. (previously presented) A sheet feeder according to claim 10, wherein said thin elastic member comprises two members spaced from each other along an axis of said sheet feed roller.

12. (previously presented) A sheet feeder according to claim 10, wherein said sheet feed roller has an axial length, and said thin elastic member is disposed substantially at a center of said axial length of said sheet feed roller.

13. (previously presented) A sheet feeder according to claim 1, further comprising a thin elastic member crossing a tangential direction of the contact area of said tilt member and said sheet feed roller at a location downstream of the contact area of said sheet feed roller with said tilt member, said thin elastic member including a bend in the shape of hook bent toward said sheet feed roller at a rear end thereof.

14. (previously presented) A sheet feeder according to claim 13, wherein said thin elastic member comprises two members spaced along an axis of said sheet feed roller.

15. (previously presented) A sheet feeder according to claim 13, wherein said thin elastic member is disposed substantially at the center of an axial length said sheet feed roller.

16. (original) A sheet feeder according to claim 13, wherein said thin elastic member crosses the tangential direction at an angle ranging from 20° to 60°.

17. (original) A sheet feeder according to claim 1, further comprising a friction member crossing a tangential direction to a contact area of said sheet feed roller in contact with said tilt member at a location downstream of the contact area.

18. (previously presented) A sheet feeder according to claim 17, wherein said friction member comprises two members spaced along an axial length of said sheet feed roller.

19. (previously presented) A sheet feeder according to claim 17, wherein said friction member is disposed substantially at a center of an axial length of said sheet feed roller.

20. (previously presented) A sheet feeder according to claim 1, further comprising:

a pressure lever having a free end configured to come in contact with and move away from said sheet stacking member;

a sensing lever mounted coaxially with said pressure lever for pivotal movement associated with insertion/removal of a cassette having said sheet stacking member; and

an elastic member disposed between said sensing lever and said pressure lever.

21. (original) A sheet feeder according to claim 20, wherein said pressure lever is pivotally moved in association with said sensing lever when an angle of said pressure lever to said sensing lever is greater than a predetermined angle.

22. (original) A sheet feeder according to claim 20, wherein said sensing lever includes a pair of arms at a free end thereof, said arms extending from both sides of said tilt member, wherein said sensing lever pivotally moves to cause said arms to pass both sides of the contact area of said tilt member.

23. (original) A sheet feeder according to claim 20, wherein said sensing lever includes spring pressure changing means for adjusting an urging force of a compression spring for pressing said tilt member onto said sheet feed roller.

24. (original) A sheet feeder according to claim 23, further comprising a spring bearer disposed slidably in an axial direction of said compression spring on an opposite side of said compression spring with respect to said tilt member, wherein said spring pressure changing means engages with and disengages from said spring bearer associated with pivotal movement of said sensing lever, and said spring pressure changing means drives said spring bearer toward said tilt member when said spring pressure changing means engages with said spring bearer.

25. (original) A sheet feeder according to claim 1, further comprising first cams disposed coaxially with said sheet feed roller for separating said sheet material stacking member from said sheet feed roller when said first cams come in contact with both side ends of a front face of said sheet material stacking member.

26. (previously presented) A sheet feeder according to claim 25, wherein said sheet stacking member includes pressor ribs at both side ends at a front face thereof, such that said first cams come in contact with said pressor ribs.

27. (original) A sheet feeder according to claim 25, further comprising second cams disposed coaxial with said sheet feed roller for separating said tilt member from said sheet feed roller when said second cams come in contact with both side ends of said tilt member.

28. (original) A sheet feeder according to claim 27, wherein said tilt member includes ribs at both side ends such that said second cams come in contact with said ribs.

29. (previously presented) A sheet feeder according to claim 27, further comprising a tilt member holder plate between said second cams and said tilt member, said tilt member holder plate being formed with an opening for avoiding a site at which said sheet feed roller comes in contact with said tilt member, said tilt member holder plate having a leading end spaced apart from said sheet stacking member.

30. (currently amended) A sheet feeder for separating sheets stacked on a pivotable sheet stacking member and for feeding said

sheets, one by one, from the topmost sheet, said sheet feeder comprising:

sheet feed roller means for coming in pressing contact with the topmost sheet for feeding the sheet to a separator; and

tilt member means for coming in pressing contact with said sheet feed roller means and including a tilt face, said sheet feed roller means having a front end running against said tilt face, said tilt member means having a contact face in contact with said sheet feed roller means,

wherein said contact face being is in the shape of a narrow raised edge extending along an axial direction of said sheet feed roller means,

said narrow raised edge forms substantially the entirety of said contact face and is adjacent to an end of said tilt face, and

said substantially the entirety of said contact face is in contact with said sheet feed roller.

31. (original) A sheet feeder according to claim 30, wherein said tilt member means is in pressing contact with said sheet feed roller means for pivotal movement with respect to said sheet feed roller means.

32. (previously presented) A sheet feeder according to claim 30, wherein said tilt member means includes translating means for advancing and retracting said tilt member means with said edge thereof remaining parallel to an axis of said sheet feed roller means.

33. (original) A sheet feeder according to claim 32, wherein said translating means includes a rib formed on one of said tilt member means and a feeder body, and a guide rail formed on the other.

34. (original) A sheet feeder according to claim 30, wherein said contact face of said tilt member has a length that is less than an axial length of said sheet feed roller means.

35. (original) A sheet feeder according to claim 30, wherein said tilt member means is formed of a synthetic resin, and includes a metal plate for covering at least the contact face with said sheet feed roller means.

36. (original) A sheet feeder according to claim 35, wherein said metal plate is elastic.

37. (previously presented) A sheet feeder according to claim 36, wherein said elastic metal plate is mounted at the tilt face so as to surround said tilt member means on both upper and lower sides.

38. (previously presented) A sheet feeder according to claim 30, wherein said sheet feed roller feeds said sheets in a sheet convey direction, and the distance in said sheet convey direction between a location of said sheet feed roller means at which said tilt member means is in pressing contact with said sheet feed roller means and a location of said sheet feed roller means at which a sheet stacked on said sheet stacking member comes in contact with said sheet feed roller means is in a range of 2 mm to 6 mm, and the angle of the tilt face of



said tilt member means to the sheet material convey direction is in a range of 50° to 70°.

39. (original) A sheet feeder according to claim 30, further comprising thin elastic member means disposed at a location downstream of a contact area of said sheet feed roller means in contact with said tilt member means such that said thin elastic member crosses a tangential direction of said contact area.

40. (previously presented) A sheet feeder according to claim 39, wherein said thin elastic member means comprises two members spaced axially along a length of said sheet feed roller means.

41. (previously presented) A sheet feeder according to claim 39, wherein said thin elastic member means is disposed substantially at a center of an axial length of said sheet feed roller means.

42. (previously presented) A sheet feeder according to claim 30, further comprising thin elastic member means crossing a tangential direction of the contact area at a location downstream of the contact area of said sheet feed roller means with said tilt member means, said thin elastic member means including a bend in the shape of hook bent toward said sheet feed roller means at a rear end thereof.

43. (previously presented) A sheet feeder according to claim 42, wherein said thin elastic member means comprises two members spaced along an axial length of said sheet feed roller means.

44. (previously presented) A sheet feeder according to claim 42, wherein said thin elastic member means is disposed substantially at the center of an axial length of said sheet feed roller means.

45. (original) A sheet feeder according to claim 42, wherein said thin elastic member means crosses the tangential direction at an angle ranging from 20° to 60°.

46. (original) A sheet feeder according to claim 30, further comprising friction member means crossing a tangential direction to a contact area of said sheet feed roller means in contact with said tilt member means at a location downstream of the contact area.

47. (previously presented) A sheet feeder according to claim 46, wherein said friction member means comprises two members spaced along an axial length of said sheet feed roller means.

48. (previously presented) A sheet feeder according to claim 46, wherein said friction member means is disposed substantially at a center of an axial length of said sheet feed roller means.

49. (previously presented) A sheet feeder according to claim 30, further comprising:

pressure lever means having a free end configured to come in contact with and move away from said sheet stacking member;

sensing lever means mounted coaxially with said pressure lever means for pivotal movement associated with insertion/removal of a cassette having said sheet stacking member; and

elastic member means disposed between said sensing lever means and said pressure lever means.

50. (original) A sheet feeder according to claim 49, wherein said pressure lever means is pivotally moved in association with said sensing lever means when an angle of said pressure lever means to said sensing lever means is greater than a predetermined angle.

51. (previously presented) A sheet feeder according to claim 49, wherein said sensing lever means includes a pair of arms at a free end thereof, said arms extending from sides of said tilt member means spaced along an axial length of said sheet feed roller means, wherein said sensing lever means pivotally moves to cause said arms to pass both sides of the contact area of said tilt member means.

52. (original) A sheet feeder according to claim 49, wherein said sensing lever means includes spring pressure changing means for adjusting an urging force of a compression spring for pressing said tilt member means onto said sheet feed roller means.

53. (original) A sheet feeder according to claim 52, further comprising spring bearing means disposed slidably in an axial direction of said compression spring on an opposite side of said compression spring with respect to said tilt member means, wherein said spring pressure changing means engages with and disengages from said spring bearing means associated with pivotal movement of said sensing lever means, and said spring pressure changing means drives said spring bearing means toward said tilt member means when said spring pressure changing means engages with said spring bearing means.

54. (previously presented) A sheet feeder according to claim 30, further comprising first cam means disposed coaxially with said sheet feed roller means for separating said sheet stacking member from said sheet feed roller means when said first cam means come in contact with side ends of a front face of said sheet stacking member.

55. (previously presented) A sheet feeder according to claim 54, wherein said sheet stacking member includes pressor rib means on side ends at a front face thereof, such that said first cam means come in contact with said pressor rib means.

56. (original) A sheet feeder according to claim 54, further comprising second cam means disposed coaxial with said sheet feed roller means for separating said tilt member means from said sheet feed roller means when said second cam means come in contact with both side ends of said tilt member means.

57. (previously presented) A sheet feeder according to claim 56, wherein said tilt member means includes rib means at side ends such that said second cam means come in contact with said rib means.

58. (previously presented) A sheet feeder according to claim 56, further comprising tilt member holder plate means between said second cam means and said tilt member means, said tilt member holder plate means being formed with an opening for avoiding a site at which said sheet feed roller means comes in contact with said tilt member means, said tilt member holder plate means having a leading end spaced apart from said sheet stacking member.

59. (currently amended) An image forming apparatus comprising:  
a sheet feeder that separates sheets stacked on a pivotable sheet material stacking member and for feeding the sheets, one by one, from the topmost sheet, said sheet feeder comprising:

a sheet feed roller configured to come in pressing contact with a topmost sheet for feeding the sheet to a separator; and

a tilt member configured to come in pressing contact with said sheet feed roller and including a tilt face, said sheet feed roller having a front end running against said tilt face, said tilt member having a contact face in contact with said sheet feed roller, ~~said contact face being in the shape of a narrow raised edge extending along an axial direction of said sheet feed roller,~~ and

an image forming mechanism configured to form an image on the sheet material fed out from said sheet feeder,

wherein said contact face is in the shape of a narrow raised edge extending along an axial direction of said sheet feed roller,

said narrow raised edge forms substantially the entirety of said contact face and is adjacent to an end of said tilt face, and

said substantially the entirety of said contact face is in contact with said sheet feed roller.

60. (currently amended) An image forming apparatus comprising:  
sheet feed means for separating sheets stacked on a pivotable sheet stacking member and for feeding the sheets, one by one, from the topmost sheet, said sheet feeder comprising:

sheet feed roller means for coming in pressing contact with a topmost sheet for feeding the sheet to separating means; and

tilt member means for coming in pressing contact with said sheet feed roller means and including a tilt face, said sheet feed roller means having a front end running against said tilt face, said tilt member means having a contact face in contact with said sheet feed roller means, ~~said contact face being in the shape of a narrow raised edge extending along an axial direction of said sheet feed roller means,~~ and

image forming means for forming an image on the sheet fed out from said sheet feeding means,

wherein said contact face is in the shape of a narrow raised edge extending along an axial direction of said sheet feed roller means,

said narrow raised edge forms substantially the entirety of said contact face and is adjacent to an end of said tilt face, and

said substantially the entirety of said contact face is in contact with said sheet feed roller.

61. (currently amended) A method of image forming, comprising the steps of:

causing a sheet feed roller to come in pressing contact with a topmost sheet of a plurality of sheets stacked on a pivotable sheet stacking member so as to feed the sheet to a separator; and

making a tilt member come in pressing contact with said sheet feed roller, said tilt member including a tilt face, said sheet feed roller having a front end running against said tilt face, said tilt member having a contact face in contact with said sheet feed roller,

wherein said contact face being is in the shape of a narrow raised edge extending along an axial direction of said sheet feed roller,

said narrow raised edge forms substantially the entirety of said contact face and is adjacent to an end of said tilt face, and  
said substantially the entirety of said contact face is in contact with said sheet feed roller.

62. (currently amended) A method of image forming, comprising the steps of:

causing a sheet feed roller to come in pressing contact with a topmost sheet or a stack of sheets stacked on a pivotable sheet stacking member so as to feed the sheet to a separator;

making a tilt member come in pressing contact with said sheet feed roller, said tilt member including a tilt face, said sheet feed roller having a front end running against said tilt face, said tilt member having a contact face in contact with said sheet feed roller, ~~said contact face being in the shape of a narrow raised edge extending along an axial direction of said sheet feed roller; and~~

forming an image on the sheet fed out from said sheet feeder,  
wherein said contact face is in the shape of a narrow raised edge extending along an axial direction of said sheet feed roller,

said narrow raised edge forms substantially the entirety of said contact face and is adjacent to an end of said tilt face, and

said substantially the entirety of said contact face is in contact with said sheet feed roller.

63. (currently amended) A sheet feeder comprising:  
a support for a stack of sheets including a topmost sheet;  
a rotationally mounted feed roller in pressing contact with the topmost sheet in the stack and rotating about an axis for frictionally feeding said topmost sheet in a feeding direction;

a sheet separating member having at least one tilt face at least a part of which is downstream from the support in said feed direction and further having at least one contact face urged in pressing contact with said feed roller;

said contact face being shaped as a narrow raised edge and extending along a line parallel to the feed roller axis, and being downstream from said support in said feeding direction;

said topmost sheet being fed in the feeding direction by said feed roller and being directed toward said edge-shaped contact face by said tilt face, and said edge-shaped contact face being operative to pass the topmost sheet between said at least one contact face and said feed roller but prevent passage therethrough of a sheet from the stack frictionally engaged with the topmost sheet and moving therewith in the feeding direction,

said narrow raised edge forming substantially the entirety of said contact face and being adjacent to an end of said tilt face, and

said substantially the entirety of said contact face being in contact with said feed roller.

64. (previously presented) A sheet feeding method comprising:  
providing a stack of sheets including a topmost sheet;  
feeding the topmost sheet in a feeding direction using a rotating feed roller in frictional contact therewith;

using a pressing contact between the feed roller and at least one contact face of a separating member to pass the topmost sheet therethrough but keep from passage a sheet from the stack that is in frictional contact with the topmost sheet and is moving therewith in the feeding direction;



said using step comprising using a pressing contact that is shaped as a narrow raised edge and extends along a line parallel to a rotational axis of the feed roller,

said narrow raised edge forming substantially the entirety of said contact face and being adjacent to an end of said tilt face, and

said substantially the entirety of said contact face being in contact with said feed roller.